

## WHAT IS CLAIMED IS:

## 1. An optical disc apparatus comprising:

a converging section for converging a light beam and irradiating a rotating information medium with the converged light beam;

a moving section for moving the converging section, thereby moving a converging point of the converged light beam in a direction perpendicular to an information surface of the information medium;

a converging state detection section for generating a focus servo signal which represents a converging state of the light beam on the information medium based on reflected light or transmitted light of the light beam from the information medium;

a focus servo control section for controlling the moving section based on the focus servo signal, so that the light beam reaches a predetermined converging state on the information medium; and

a focus pull-in section for turning ON the control by the focus servo control section,

wherein the focus pull-in section turns ON the control by the focus servo control section in a case where the focus pull-in section determines that the converging point of the light beam is located in the vicinity of the minimum velocity position on the information medium axial deviation.

2. An optical disc apparatus according to claim 1, further comprising an S-shape signal detection section for detecting S-shape signals which appear in the focus servo signal when the converging point of the light beam contacts the information surface of the information medium,

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3. An optical disc apparatus according to claim 2, further comprising a detected interval measuring section for measuring an interval between temporally adjoining two of the S-shape signals,

4. An optical disc apparatus according to claim 3, wherein the S-shape signal detection section detects the S-shape signals by either moving the converging point of the light beam toward or away from the information surface of the information medium, or making the converging point of the light beam wait at a predetermined position.

5. An optical disc apparatus according to claim 4, wherein the S-shape signal detection section detects the S-shape signals by retrying to move the converging point of the light beam toward the information surface of the information medium at a predetermined speed, in the case where the interval is not output from the detected interval measuring section after the elapse of time required for one revolution of the information medium.

6. An optical disc apparatus according to claim 5, wherein a retry speed of the converging point of the light beam is

set so as to be smaller than a speed of the previous motion toward or away from the information surface of the information medium.

7. An optical disc apparatus according to claim 4, wherein the S-shape signals are detected by making the converging point of the light beam wait at a predetermined position in the case where the interval is not output from the detected interval measuring section after the elapse of the first period.

8. An optical disc apparatus according to claim 2, further comprising a time width measuring section for measuring a time width of a predetermined portion of an S-signal,

wherein the focus pull-in section determines that the converging point of the light beam is located in the vicinity of the minimum velocity position on the information medium axial deviation when the interval exceeds a predetermined second period of time.

9. An optical disc apparatus according to claim 8, wherein the S-shape signal detection section detects the S-shape signal by either moving the converging point of the light beam toward or away from the information surface of the information medium, or making the converging point of the light beam wait at an predetermined position.

10. An optical disc apparatus according to claim 9, wherein the S-shape signal detection section detects the S-shape signals by retrying to move the converging point of the light beam toward the information surface of the information medium at a predetermined speed, in the case where the interval is not output from the detected interval measuring

11. An optical disc apparatus according to claim 10, wherein a retry speed of the converging point of the light beam is set so as to be smaller than a speed of the previous motion toward or away from the information surface of the information medium.

13. An optical disc apparatus according to claim 1, wherein the focus pull-in section turns ON the control by the focus servo control section when it is detected that the level of the focus servo control section reaches a predetermined pull-in level.

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wherein the focus pull-in section determines a moving speed or a waiting position of the converging point of the light beam when the focus pull-in section moves the

converging point of the light beam toward or away from the information surface of the information medium, or makes the converging point of the light beam wait at a predetermined position.

19. An optical disc apparatus according to claim 18, wherein the conversion point of the light beam, moving toward the information surface of the information medium, is kept at a predetermined driving value based on the detection result of the type of the information medium, whereby the conversion point of the light beam is kept from approaching unnecessarily close to the information medium.

20. An optical disc apparatus according to claim 1, further comprising a lower limit detection section for detecting the lower limit of an output signal of the focus servo control section or an input signal thereof during the operation of the focus servo control section, and a lower limit storing section for storing the detected lower limit,

wherein, in the case where the focus servo control section is restarted after the focus servo control section is OFF: it is determined that the converging point of the light beam is in the vicinity of the minimum velocity position on the information medium axial deviation when the converging point of the light beam contacts on the information surface of the information medium until the output signal or the drive signal reaches the lower limit by driving the moving section; and the focus pull-in section performs a retry operation which restarts the control by the focus servo control section when it is determined that the level of the focus servo signal reaches a predetermined pull-in level.

22. An optical disc apparatus according to claim 20, wherein the lower limit detection section operates during the operation of the focus servo control section, whereby the stored value of the lower limit storing section is continuously updated.

Year	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100
1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	

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